Method for supplying communication services to end users

Field of the invention

The invention relates to the field of telecommunications, more particularly to technologies of providing end users with various types of telecommunication services.

Background of the invention

Nowadays, communications access networks and, in particular, their Local Exchanges (sometimes called Central Offices) are adapted to provide a variety of subscriber lines, for example: basic analogue POTS (Plain Old Telephone Service) lines for delivering voice, various types of symmetric and asymmetric digital subscriber lines (DSL) being high-speed connection lines that use the same wires as regular telephone lines, so-called ISDN lines (Integrated Service Digital Network), which is a system of digital phone connections that allows voice and data to be transmitted simultaneously using end-to-end digital connectivity.

So-called broadband access networks are capable of delivering advanced voice, data and video services to end users (subscribers), by using enhanced DSL and ISDN solutions, and by interconnecting to IP, ATM and various wireless and cellular networks.

The conventional and worldwide accepted way of providing a private subscriber with telecommunication services usually means "tailoring" the access network infrastructure according to the end user's specific demand at the time of arranging the subscription. If the end user orders only a telephone voice service, he/she is given a conventional POTS line. In cases the end user wishes to get more advanced services at home, allowing him to use a digital telephone, a fax machine, a computer,

the end user may receive a DSL line. For arranging local area networks for small offices or the like, and/or for easily using high rate data services, such as video and fast internet, the subscriber will be offered advanced DSL solutions, such as ADSL (Asymmetric DSL), VDSL (Very high data rate DSL), SHDSL (Single pair High bit rate DSL), ISDN, and/or other broadband telecommunication services.

So called Digital Subscriber Line Access Multiplexer (DSLAM) is a distribution unit located at the Local Exchange or at a Street Cabinet, which is positioned between the Local Exchange and the subscribers, comprises a plurality of different "line cards" which suit to different types of services available from the Local Exchange and ordered by the subscribers. For example, a DSLAM may include, in various combinations, a number of POTS (voice only) line cards for voice only subscribers, a number of ADSL cards for residential asymmetric services, a number of SDSL cards with a single or multiple pairs for symmetric services, a number of VDSL cards for symmetric business services or asymmetric high speed residential services, a number of combined POTS and DSL cards (so-called Integrated Voice-Data "IVD" cards), etc.

Each subscriber, when first connected to the Local Exchange, obtains the service according to the personal demand. In most cases, connecting a new subscriber to the Local Exchange requires rewiring the DSLAM at the Local Exchange. In case the DSLAM is located in a street cabinet, connecting a new subscriber to the Local Exchange will mean a special visit of a technician to the street cabinet.

Once the subscriber decides to upgrade or downgrade the communication services in the premises, a technician may need to rewire the DSLAM at the Local Exchange or the street cabinet and add or replace the installed line cards in the DSLAM, if the specific requested

service penetration exceeds preliminary expectations with respect to the mixture of line cards in the DSLAM.

Owing to the above, determining the optimal ratio between the broadband services and narrowband services in the access networks (i.e., and therefore the mixture of line cards in each DSLAM) is always a multi-parameter task, since it should take into account the present demand, the technological and sociological trends, as well as various economical factors.

Summary of the invention

It is therefore the object of the present invention to resolve the above problem of upgrading/downgrading the telecommunication services provided to the subscribers in a converged narrowband and broadband networks, and also the problem of designing suitable access systems, in particular – the problem of designing a right mixture of line cards in the DSLAM in street cabinets and Local Exchanges.

In other words, the object is to find a technology that fits for migration from voice only networks to converged networks as well as for newly developed areas/groups of subscribers where the access network infrastructure is just organized.

According to the first aspect of the invention, the object can be achieved by providing a method of supplying end users (subscribers) with telecommunication services from a distribution unit in an access network, the method comprises providing one and the same technologically advanced type of broadband communication service selected for said distribution unit to substantially all end users assigned to the distribution unit, including the end users ordering narrowband communication services.

The method is actually based on providing the uniform, usually most advanced telecommunication technology to all subscribers, be it a subscriber who ordered the voice only service, that could be satisfied with a simple POTS link or a subscriber that actually ordered a most demanding service. Even if the specific communication service ordered by a particular end user is an analogue telephony, the service arrives to the customer premises over a digital medium, which is beyond what the current needs of the end user are.

The method supposes providing the advanced broadband communication service to a particular end user via at least one communication line.

Selection of the type of said broadband communication service may depend on various factors, such as geographical location of the access network to be served, social status of the population and its trend, the maximal distance between the distribution unit and the end users, etc.

The method preferably comprises a further step of providing a particular subscriber with a Customer Premises Equipment unit (CPE) specifically configured for deriving from the broadband communication service only a set of specific communication services ordered by said particular subscriber.

The method may further comprise a step of upgrading/downgrading the specific communication services at said subscriber's premises, by modifying the configuration or entirely replacing the specifically configured CPE unit.

The term "substantially all subscribers" should be understood as all subscribers, including voice only subscribers, taken as a concept of providing equal telecommunication infrastructure for the clientele of a converged narrowband and broadband network provider. The word

"substantially" is used for the purposes of patent protection against conscious infringement.

In the method defined above, the distribution unit (usually, in the form of DSLAM – DSL Access Multiplexer) is preferably located as close to the end user as possible (e.g., in a street cabinet) for that maximizes the benefits of the invention by enabling use of the most advanced technology available, such as VDSL. VDSL enables running any type of service over the DSL line, including symmetric and asymmetric applications.

The proposed method enables eliminating the need for frequent DSLAM re-wirings and line card installation changes. Though it seems rather expensive at the stage of providing the telecommunication infrastructure, it brings certain advantages owing to its uniformity and modularity. Further, it turns to be cost-effective at the stage of connecting real subscribers to the infrastructure since it does not require rewiring or changing the mixture of line cards in the distribution unit or visiting the subscriber's neighborhood.

The proposed method, at the stage of adding a new subscriber to the network, means selling to the subscriber a CPE that is adapted for the service or services ordered by that specific subscriber. At the stage the subscriber wishes to modify the service or services he/she needs according to either growing or declining demands, it means just selling, exchanging or re-configuring the CPE he/she has. Re-configuring the CPE remotely is obviously a preferred solution. **(How? By software means?)**

As described above, utilizing a uniform broadband technology even for providing analogue telephony service to the end user actually brings the telephony service to the premises over a digital medium. This

enables providing enhanced and advanced features to the end user even while he/she remains a voice-only customer. These features (e.g., sending to a user short alphabetic-numeric messages that can be displayed if the end user has a certain type of telephony equipment) are usually unavailable with the analogue medium.

Utilizing a broadband technology even for providing analogue telephony service to the end user also allows reusing the spectrum, which is usually occupied by analogue voice services, for any digital services. In advanced DSL technologies this mode is called All Digital mode.

According to a second aspect of the invention, there is proposed a communication service distribution unit for use in an access network, adapted to provide one and the same type of technologically advanced broadband communication service, selected for said distribution unit, to substantially all end users (subscribers) assigned to the distribution unit, wherein said assigned end users include one or more end users ordering narrowband communication service.

Further, there is proposed a Customer's Premises Equipment (CPE) unit for use in a subscriber's premises and in conjunction with said distribution unit, the CPE being configured for deriving specific communication services ordered by the specific subscriber from said broadband communication service provided by the distribution unit.

Finally, there is provided a set of access network equipment, comprising at least one above-defined distribution unit and at least one said CPE unit.

Brief description of the drawings

The invention will be further described and illustrated in more detail with reference to the following non-limiting drawings, in which:

Fig. 1 (prior art) schematically illustrates a usual distribution of various cards in a street cabinet for supplying terminal subscribers with different communication services, beginning from voice only and up to VDSL.

Fig. 2 schematically illustrates one example of a so-called "last mile copper solution" proposed by the invention.

Detailed description of the preferred embodiments.

Fig. 1 schematically illustrates the components which are presently designed for and utilized in a typical distribution device (Street Cabinet or Local Exchange).

In this example, a Street Cabinet system (schematically marked 10) can be connected to the Local Exchange by an optical fiber (not shown) and comprises a number of POTS (Plane Old Telephony Service) cards 12 for voice only subscribers, a number of xDSL (represents any of various Digital Subscriber Line technologies) cards 14, some SHDSL (Single-pair High-bit-rate Digital Subscriber Line) cards 16 for symmetric data subscribers, and a number of Integrated Voice-Data cards IVD 18 and 20, intended for subscribers ordering both the voice services and the data services. Types of the cards (such as IVD ADSL or IVD VDSL) may be different and depend on particular combinations of services, which are required.

Advanced street cabinets may further include a copper matrix 22 and a set of splitters 24.

Problems of the communication service providers, before purchasing a particular street cabinet, are the following:

1.Estimation of the broadband services penetration to a particular area, for selecting the ratio between "voice only" subscribers and "voice &data" subscribers. If the broadband penetration is underestimated, the cabinet would quickly require rewiring of exiating shelves and even providing new shelves.

2.Estimation of the ratio between penetration of various DSL technologies: ADSL, SHDSL, and VDSL.

Since the proportion between different types of cards is unknown in each particular case, all the units are marked with unknown percentage values X, Y, Z, W, F.

Fig. 2 schematically illustrates the proposed method of supplying the end users with communication services in an access network.

Substantially all cards in a street cabinet 40 are the Integrated Voice and Data (IVD) cards, and the street cabinet 40 provides all its subscribers, by default, with an advanced broadband VDSL technology.

Alternatively, the communication lines may provide ADSL2+ broadband technology or, generally, any DSL technology selected for this particular distribution unit. Selection of the maximally allowed type of service depends on the specific area, its present maximal demands for telecommunication services, its perspectives for technological development, sociological trends in the population, etc.

Each subscriber at his/her premises (42, 44, 46, 48) receives a communication line (only one line per subscriber is shown: 41, 43, 45, 47) enabling the subscriber to use the most advanced broadband services over the DSL line.

To derive the required service from the default line, every subscriber is equipped with a personally configured CPE (Customer Premises Equipment). For example, a POTS-only CPE powered from a remote site, over the copper line, can be manufactured at a very low cost and comprise a splitter with a POTS/low pass filter. Current configurations of CPE devices are selected according to each particular case and will not be discussed in the frame of the present application.

The proposed approach will guarantee the VDSL performance to all subscribers by default, including the voice-only subscribers. It will make digital services available to all the subscribers, and will also enhance the voice services. It will as well allow utilizing the spare voice spectrum for the digital data services. The proposed approach enables using uniform cards in the street cabinet and almost excludes visits of operators to the remote sites, since if a subscriber wishes to change its profile of the ordered services, he/she will simply be provided with a suitable configuration for his/her existing CPE, or with a replacing CPE.

Claims:

1. A method for supplying subscribers with telecommunication services from a distribution unit in an access network, the method comprises providing one and the same technologically advanced type of broadband communication service selected for said distribution unit to substantially all subscribers assigned to the distribution unit, including the subscribers that order narrowband communication services.

2. The method according to Claim 1, further comprising a step of providing a particular subscriber with a Customer Premises Equipment unit (CPE) specifically configured for deriving from said broadband communication service only a set of specific communication services ordered by said particular subscriber.

3. The method according to Claim 2, further comprising a step of upgrading/downgrading the specific communication services at said subscriber's premises, by changing or reconfiguring the specifically configured CPE unit.

4. The method according to any one of the preceding claims, wherein the distribution unit is a DSLAM positioned either in a Street Cabinet or in a Local Exchange.

5. The method according to any one of the preceding claims, wherein the technologically advanced type of broadband communication service is VDSL (Very high data rate Digital Subscriber Line).

6. The method according to any one of the preceding claims comprising a preliminary step of selecting the technologically advanced type of broadband communication service to be provided from said distribution unit to the subscribers.

7. A communication service distribution unit for use in an access network, adapted to provide one and the same type of technologically advanced broadband communication service, selected for said distribution unit, to substantially all subscribers assigned to the distribution unit, wherein said assigned subscribers include one or more subscribers ordering a narrowband communication service.

8. A Customer's Premises Equipment (CPE) unit for use in a subscriber's premises and in conjunction with the distribution unit according to Claim 7, the CPE being configured for deriving specific communication services ordered by the specific subscriber from said broadband communication service provided by the distribution unit.

9. A set of access network equipment, comprising at least one distribution unit according to Claim 7, and at least one CPE unit according to claim 8.